VIRAL HEMORRHAGIC FEVERS

EBOLA HEMORRHAGIC FEVER

Ebola hemorrhagic fever (Ebola HF) is a severe, often-fatal disease in humans and nonhuman primates (monkeys and chimpanzees) that has appeared sporadically since its initial recognition in 1976.

The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. The virus is one of two members of a family of viruses called the Filoviridae. Three of the four species of Ebola virus identified so far have caused disease in humans: Ebola-Zaire, Ebola-Sudan, and Ebola-Ivory Coast. The fourth, Ebola-Reston, has caused disease in nonhuman primates but not in humans.

The exact origin, locations and natural habitat (known as the "natural reservoir") of Ebola virus remain unknown. On the basis of available evidence and the nature of similar viruses, however, researchers believe that the virus is zoonotic (animal-borne) and is normally maintained in an animal host that is native to the African continent. A similar host probably is associated with Ebola-Reston isolated from infected cynomolgous monkeys that were imported to the United States and Italy from the Philippines. The virus is not known to be native to other continents, such as North America.

Confirmed cases of Ebola hemorrhagic fever have been reported in the Democratic Republic of the Congo, Gabon, Sudan, the Ivory Coast and Uganda. An individual with serologic evidence of infection but showing no apparent illness has been reported in Liberia, and a laboratory worker in England became ill as a result of an accidental needle-stick. No case of the disease in humans has ever been reported in the United States. Ebola-Reston virus caused severe illness and death in monkeys imported to research facilities in the United States and Italy from the Philippines; during these outbreaks, several research workers became infected with the virus but did not become ill.

Ebola HF typically appears in sporadic outbreaks, usually spread within a health-care setting (a situation known as amplification). It is likely that sporadic, isolated cases occur as well but go unrecognized.

Infection with Ebola virus in humans is incidental – humans do not carry the virus. Because the natural reservoir of the virus is unknown, the manner in which the virus first appears in a human at the start of an outbreak has not been determined. However, researchers have hypothesized that the first patient becomes infected through contact with an infected animal.

After the first case-patient in an outbreak setting (often called the index case) is infected, humans can transmit the virus in several ways. People can be exposed to Ebola virus from direct contact with the blood and/or secretions of an infected person. This is why the virus has often been

spread through the families and friends of infected persons: in the course of feeding, holding or otherwise caring for them, family members and friends would come into close contact with such secretions. People also can be exposed to Ebola virus through contact with objects such as needles that have been contaminated with infected secretions.

Nosocomial transmission has been associated frequently with Ebola HF outbreaks. It includes both types of transmission described above, but it is used to describe the spread of disease in a health-care setting such as a clinic or hospital. In African health-care facilities, patients often are cared for without the use of a mask, gown or gloves, and exposure to the virus has occurred when health-care workers treated individuals with Ebola HF without wearing these types of protective clothing. In addition, when needles or syringes are used, they may not be of the disposable type, or the may not have been sterilized but only rinsed before re-insertion into multi-use vials of medicine. If needles or syringes become contaminated with virus and are then reused, numbers of people can become infected.

Ebola-Reston that appeared in a primate research facility in Virginia may have been transmitted from monkey to monkey through the air in the facility. While all Ebola virus species have displayed the ability to be spread through airborne particles (aerosols) under research conditions, this type of spread has not been documented among humans in a real-world setting, such as a hospital or household.

The signs and symptoms of Ebola HF are not the same for all patients. The table below outlines symptoms of the disease, according to the frequency with which they have been reported in known cases.

Time Frame	Symptoms that occur in most Ebola patients	Symptoms that occur in some Ebola patients
Within a few days of becoming infected with the virus:	high fever, headache, muscle aches, stomach pain, fatigue, diarrhea	sore throat, hiccups, rash, red and itchy eyes, vomiting blood, bloody diarrhea
Within one week of becoming infected with the virus:	chest pain, shock and death	blindness, bleeding

Researchers do not understand why some people are able to recover from Ebola HF and others are not. However, it is known that patients who die usually have not developed a significant immune response to the virus at the time of death.

Diagnosing Ebola HF in an individual who has been infected only a few days is difficult because early symptoms, such as red and itchy eyes and a skin rash, are nonspecific to the virus and are seen in other patients with diseases that occur much more frequently. If a person has the constellation of symptoms described in the table above and infection with Ebola virus is suspected, several laboratory tests should be done promptly. These include a blood film examination for malaria and a blood culture. If the suspected patient has bloody diarrhea, a stool culture also should be performed.

There is no standard treatment for Ebola HF. Currently, patients receive supportive therapy. This consists of balancing the patient’s fluids and electrolytes, maintaining their oxygen status and blood pressure, and treating them for any complicating infections. During the Kikwit outbreak,

eight patients were given blood from individuals who had been infected with Ebola virus but recovered. Seven of the eight patients survived. However, because the study size was small and participants' characteristics (including the fact that they were relatively young) predisposed them towards recovery, the efficacy of the treatment remains unknown.

The prevention of Ebola HF in Africa presents many challenges. Because the identity and location of the natural reservoir of Ebola virus are unknown, there are few established primary prevention measures.

If cases of the disease do appear, current social and economic conditions favor the spread of an epidemic within health-care facilities. Therefore, health-care providers must be able to recognize a case of Ebola HF should one appear. They also must have the capability to perform diagnostic tests and be ready to employ practical viral hemorrhagic fever isolation precautions or barrier nursing techniques. These techniques include the wearing of protective clothing, such as masks, gloves, gowns, and goggles; the use of infection-control measures, including complete equipment sterilization; and the isolation of Ebola HF patients from contact with unprotected people. The aim of all of these techniques is to avoid any person's contact with the blood or secretions of any patient. If a patient with Ebola HF dies, it is equally important that direct contact with the body be prevented.

For more information, call the North Dakota Department of Health at 701.328.2378.